

NEW COURSE PROPOSAL

DATE OCTOBER 18, 2005

PROGRAM AREA CHEMISTRY

1. Catalog Description of the Course. *[Follow accepted catalog format.]*

Prefix CHEM Course# 110 Title Chemistry of Life Units (4)

3 hours twice per week

☒ Prerequisites Satisfy the Entry Level Mathematics (ELM) requirement

☐ Corequisites

Description Fundamentals of chemistry including the composition of atoms and molecules, mass balance, energy, properties of gases and solutions, solubility, diffusion, ionic strength, acid-base chemistry, and basic nuclear chemistry. Structure and reactivity of inorganic, organic, and biological molecules. Enzyme catalysis, including the metabolism of sugars, lipids, and proteins. Hazards of chemicals and their interactions with the human body. Integrated lecture and laboratory. No credit given towards the Chemistry major.

A lab fee is required.

☒ Gen Ed ☐ Graded ☐ CR/NC ☐ Repeatable for up to _____ units

Categories B1

☒ Lab Fee Required ☒ A - Z Total Completions Allowed _____

2. Mode of Instruction.

	Units	Hours per Unit	Benchmark Enrollment	Graded Component	CS # (filled in by Dean)
Lecture	3	1	24	☒	_____
Seminar	_____	_____	_____	☐	_____
Laboratory	1	3	24	☒	_____
Activity	_____	_____	_____	☐	_____

3. Justification and Learning Objectives for the Course. (Indicate whether required or elective, and whether it meets University Writing, and/or Language requirements) *[Use as much space as necessary]*

This course is a requirement for students in the B.S. Nursing and is designed to meet the needs of both General Education students and students in the B.S. in Nursing program.

Students who successfully complete this course will be able to:

- Describe the scientific method and how it is used to approach chemical problems
- Explain the differences between elements, chemical compounds, ions, and mixtures
- Calculate the concentrations and solubilities of compounds in mass percent and molarity
- Define acids and bases and pH of solutions
- Calculate hydrogen-ion concentration and pH
- Discuss how and why acid-base reactions occur
- Explain how and why oxidation-reduction reactions occur
- Determine the rate of a reaction and the energy change in a reaction
- Explain the molecular structure of inorganic, organic, and biological compounds
- Describe fundamental nuclear chemical processes and their medical applications
- Explain enzyme catalysis and inhibition
- Describe energy production in the metabolism of sugars, proteins, and lipids
- Define chemical hazards of particular classes of chemicals
- Explain how chemicals interact with the human body

4. Is this a General Education Course YES ☒ NO ☐

If Yes, indicate GE category and attach GE Criteria Form:

A (English Language, Communication, Critical Thinking)

A-1 Oral Communication ☐

A-2 English Writing ☐

A-3 Critical Thinking ☐

B (Mathematics, Sciences & Technology)

B-1 Physical Sciences ☒

B-2 Life Sciences – Biology ☐

B-3 Mathematics – Mathematics and Applications ☐

B-4 Computers and Information Technology ☐

C (Fine Arts, Literature, Languages & Cultures)

C-1 Art ☐

C-2 Literature Courses ☐

C-3a Language ☐

C-3b Multicultural ☐

D (Social Perspectives) ☐

E (Human Psychological and Physiological Perspectives) ☐

UD Interdisciplinary ☐

5. Course Content in Outline Form. *[Be as brief as possible, but use as much space as necessary]*

- I. Measurements and the Scientific Method
 - A. Units and Significant Figures
 - B. Unit Conversion
 - C. Scientific Method: Hypotheses, Theories, Experiments, and Conjecture
- II. Chemical Composition
 - A. Subatomic Particles, Atoms, and the Periodic Table
 - B. Molecules and the Nature of the Chemical Bonds
 - C. Compounds and Mixtures
 - D. Ions and Salts
 - E. Molecular Structure of Inorganic Compounds
- III. Physical Properties of Matter
 - A. States of Matter
 - B. Mass, Density, and Viscosity
 - C. Solubility and Solutions
 - D. Chemical Hazards of Gases, Liquids, and Solids
- IV. Chemical Reactions
 - A. Acid-Base Chemistry
 - B. Oxidation-Reduction Reactions
 - C. Rates of and Energy Changes in Reactions
 - D. Classifications of Chemical Reactions
 - E. Nuclear Chemistry and its Applications in Medicine
- V. Organic and Biological Molecules
 - A. Functional Groups and Interactions Between Molecules
 - B. Origin of Molecular Shape
 - C. Structures of Amino Acids, Sugars, Proteins, Nucleic Acids, and Lipids
 - D. Enzyme Catalysis and Inhibition
 - E. Amino Acid Function and Biosynthesis
 - F. Protein Function and Biosynthesis
 - G. Nucleic Acid Function and Biosynthesis
 - H. Energy Production: Metabolism of Sugars, Proteins, and Lipids
 - I. Biological Membranes: Structure, Function, Active and Passive Transport
 - J. Oxidative Phosphorylation and Electron-Transport

Note: Approximate coverage for this course is General Chemistry 40%, Organic Chemistry 20%, and Biochemistry 40%

Does this course overlap a course offered in your academic program? YES X NO
If YES, what course(s) and provide a justification of the overlap?

This course is a requirement for students in the B.S. Nursing and is designed to meet the needs of both General Education students and students in the B.S. in Nursing program.

Does this course overlap a course offered in another academic area? YES ☐ NO ☒
If YES, what course(s) and provide a justification of the overlap?

Signature of Academic Chair of the other academic area is required on the consultation sheet below.

6. Cross-listed Courses (Please fill out separate form for each PREFIX)

List Cross-listed Courses

Signature of Academic Chair(s) of the other academic area(s) is required on the consultation sheet below

Department responsible for staffing: CHEM

7. References. *[Provide 3 - 5 references on which this course is based and/or support it.]*

Timberlake, K. C. Chemistry: An Introduction to General, Organic, and Biological Chemistry, 9th Edition, Benjamin Cummings/ Pearson: San Francisco, CA, 2006.

McMurry, J.; Castellion, M. E., Fundamentals of General, Organic, and Biological Chemistry, 4th Ed., Prentice Hall, 2002.

Denniston, K; Topping, J., General, Organic and Biochemistry, McGraw-Hill Education: Europe, 2003.

8. List Faculty Qualified to Teach This Course.

Prof. Phil Hampton, Prof. Blake Gillespie, Prof. Simone Aloisio

9. Frequency.

a. Projected semesters to be offered: Fall ☐ Spring ☒ Summer ☐

10. New Resources Required. YES ☐ NO ☐

If YES, list the resources needed and obtain signatures from the appropriate programs/units on the consultation sheet below.

a. Computer (data processing), audio visual, broadcasting needs, other equipment)

b. Library needs

c. Facility/space needs

11. Will this new course alter any degree, credential, certificate, or minor in your program? YES ☐ NO ☒

If, YES attach a program modification form for all programs affected.

Phil Hampton

Proposer of Course

Date

GE CRITERIA APPROVAL FORM

Course Number and Title: CHEM 110. Chemistry of Life

Faculty member(s) proposing Course: Phil Hampton

Indicate which of the following GE would be satisfied by this course by marking an “X” on the appropriate lines.

Courses may be placed in up to two GE categories as appropriate. Upper Division Interdisciplinary GE courses (UDIGE) may be placed in two GE categories in addition to the UDIGE category.

GE Category	
☐	A1: Oral Communication
☐	A2: English Writing
☐	A3: Critical Thinking
☒	B1: Physical Sciences—Chemistry, Physics, Geology, and Earth Sciences
☐	B2: Life Sciences—Biology
☐	B3: Mathematics—Mathematics and Applications
☐	B4: Computers and Information Technology
☐	C1: Art
☐	C2: Literature
☐	C3a: Language
☐	C3b: Multicultural
☐	D: Social Perspectives
☐	E: Human Physiological and Psychological Perspectives
☐	Upper Division Interdisciplinary GE
Lab Included? Yes ☒ No ☐	

Please provide a brief explanation of how the proposed course meets *each* of the criteria for the selected GE categories.

All Category B courses shall:

- Promote the understanding and appreciation of the methodologies of math or science as investigative tools and the limitations of mathematical or scientific endeavors

This course will examine basic chemistry principles important to the healthcare profession. The course will discuss the Scientific Method and how it is applied to Chemistry problems, and the limitations of the Scientific Method. In addition, the strengths and limitations of chemistry methodologies will be examined.

- Present mathematical or scientific knowledge in a historical perspective and the influences of math or science on the development of world civilizations, both past and present

The course will present a historical perspective on the development of the field of chemistry and the impact of these chemical developments on the history of the healthcare profession and human health.

- Apply inductive and deductive reasoning processes and explore fallacies and misconceptions in the mathematical or scientific areas.

The application of deductive and inductive reasoning processes is fundamental to the instruction of basic chemical concepts. Students in the course will be taught how to reason from experimental data to form conclusions regarding chemical concepts. In addition to presenting examples of good reasoning, students will learn to differentiate good reasoning from fallacies, misconceptions and poor reasoning, for example in the alleged “memory properties” of water in high dilutions of homeopathic medicines.

Category B-1 Physical Sciences—Chemistry, Physics, Geology, and Earth Sciences courses shall:

- Present the principles and concepts of the physical sciences and the physical universe.

The course will focus on a discussion of basic chemistry principles and concepts and their impact on human health and the healthcare profession.